

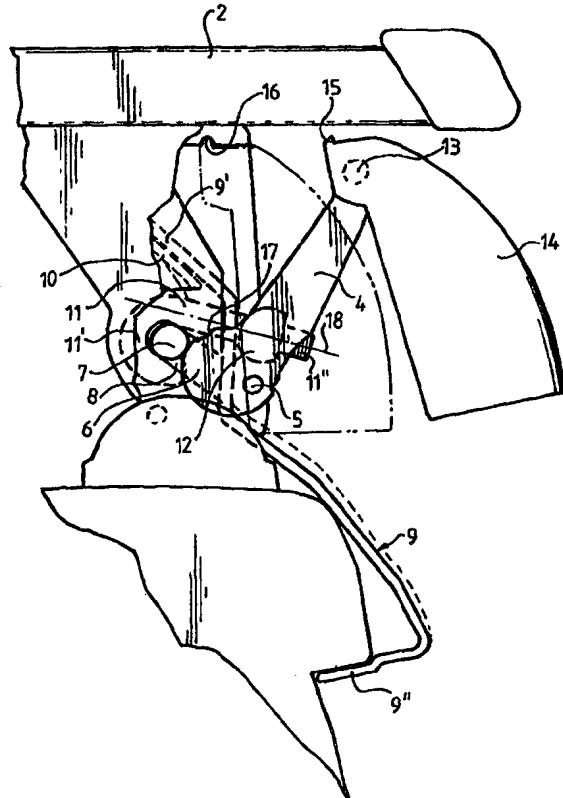


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(54) Title: A DEVICE AT A ROOF MOUNTED LOAD CARRIER FOR VEHICLES**(57) Abstract**

The invention relates to a device in a load carrier for vehicles, which is intended for roof mounting, said load carrier having support members (3) which are adapted to rest against the upper side of the vehicle roof (1) close to the edge thereof, a gripping member (9) gripping the edge portion of the vehicle roof, actuators which are actuatable by means of a lever (4) and adapted to clamp round the roof edge, and a handle (14) in connection with the lever (4) for operating the same. According to the invention, the lever (4) and the handle (14) are interconnected by means of a pivot (13) which in the active state of the device, i.e. in its clamping position, is positioned in the area of the upper part of the support member, while the lever at its other end portion is non-positively connected to said actuators in the area of the lower part of the support member (3), the handle and the lever forming a toggle joint system, which is foldable from the clamping position with a folded knee located in the upper part of the support member by pivoting the lever outwards to the release position of the device while straightening said knee.



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A DEVICE AT A ROOF MOUNTED LOAD CARRIER
FOR VEHICLES

The present invention relates to a device at a load carrier for vehicles, which is intended for roof mounting, said load carrier having support members which are adapted to rest against the upper side of the vehicle

5 roof close to the edge thereof, a gripping member gripping the edge portion of the vehicle roof in a hook-shaped manner, actuators which are actuatable by means of a vertically pivotable lever and adapted to pull together the support member and the gripping member to

10 a position gripping the associated roof edge portion, and a handle in connection with the lever for operating the same.

US-A-5,641,107 discloses a device of the type mentioned above. Here the actuators for pulling together

15 the support member and the gripping member are formed of an eccentric cam means on a pivotable lever, said cam means, as the lever pivots, actuating a yoke member which in turn is connected with a gripping member in such manner that the gripping member, as the lever pivots

20 upwards, grips and is pressed against the edge portion of the roof of the vehicle. In the device described in the above publication, the lever itself forms both a handle and a cover which in the clamping position of the lever rests against the support member and thus encloses sensitive parts of the clamping mechanism and protects these against unintentional and unauthorised actuation. Owing to the fact that the lever itself constitutes a cover with projecting parts, these cause, as the lever pivots outwards from the support member, a restriction of its

25 possible outwards pivoting motion. This restricted outwards pivoting motion means that high demands must be placed on the choice of cam pitch and presetting of the

starting position of the gripping member so as to achieve safe locking as the lever pivots upwards.

The main object of the invention is to provide a device which permits a greater pivoting motion of the 5 lever and, thus, a greater motion of the gripping member and/or a greater exchange of forces, which results in increased gripping safety of the device with a reduced degree of sensitivity as to its presetting.

According to the present invention, this object is 10 achieved by a device which is essentially characterised in that the lever and the handle are interconnected by means of a pivot which in the active state of the device, i.e. in its clamping position, is positioned in the area of the upper part of the support member, while the lever 15 at its other end portion is non-positively connected to said actuators in the area of the lower part of the support member, the handle and the lever forming a toggle joint system, which is foldable from the clamping position with a folded knee located in the upper part of the 20 support member when pivoting the lever outwards to the release position of the device while straightening said knee. Owing to this construction in which the handle, which preferably is also designed to form a cover, is 25 hingedly connected with the lever as a separate part, the lever is allowed to make an extremely great angular movement without being obstructed by the handle which thus does not come into conflict with the other parts of 30 the support member and the gripping member. The lever's enhanced possibility of pivoting results in very great liberty in respect of selecting exchange of forces and/or size of the motion which the force-transferring means at issue is allowed to perform. This also applies to other types of actuators arranged between the support member and the gripping member than the type of actuator dis- 35 closed in the above-mentioned US-A-5,641,107, in which the actuators are formed of a combination of eccentric means and a yoke member which is movable in a so-called

scissor pinch between a cam surface and a cam path inclined to the cam surface.

Further details and advantages of the invention will appear from the following specification and claims with 5 reference to the accompanying drawings, in which

Fig. 1 shows a portion of a vehicle on which a load carrier according to the invention is placed,

Fig. 2 is a view which corresponds to that in Fig. 1 and in which the load carrier has been clamped to the 10 vehicle,

Fig. 3 is a schematic cross-sectional view of the load carrier and the vehicle at one support member of the load carrier in the not yet clamped state of the load carrier as shown in Fig. 1,

15 Fig. 4 is a corresponding cross-sectional view of the load carrier in connection with its one support member in a partially clamped and fully clamped state of the load carrier, and

20 Fig. 5 is a cross-sectional view of the same load carrier in connection with its one support member, the section being made centrally through the support member and associated parts.

The load carrier shown in the drawings consists of a load-carrying rail 2, which extends transversely of the 25 vehicle across the roof 1 thereof and which in the vicinity of the outer side edges of the roof rests against the upper side of the vehicle roof by means of support members 3, of which, for the sake of simplicity, only one is shown. The support member 3 can be fixed to the load-30 carrying rail in any suitable manner whatever, for example by means of a screw joint or some kind of clamping joint. Since this attachment can be of any type known per se and is not crucial to the invention, it will not be described here. The support member 3 is suitably in its 35 lower part provided with an engaging part 3' which preferably is fitted with a soft sole and which is turnably fixed to the remaining portion 3" of the support member

and, thus, adaptable to the inclination of the roof in the position of engagement. A lever designated 4 is vertically pivotally mounted at a fulcrum 5 which suitably can be formed of a horizontal pivot pin extending through 5 the lever 7 and the support member 3. In the embodiment illustrated, the lever is composed of two lever members extended essentially in parallel with each other, as is best seen in Fig. 1. Each of the levers is, at its end closest to the fulcrum 5, formed with a cam-like eccentric portion 6. A yoke member extended essentially in parallel with the pivot pin 5 is designated 7 and is displaceable in its transverse direction, mounted in a guide means 8 which in the shown embodiment consists of two spaced-apart, seen in the longitudinal direction of the 10 yoke member 7, guide slots. As is partly to be seen in Fig. 1, the support member 3 can be U-shaped, seen in a horizontal cross-section, and is directed with an open side outwards to the side of the vehicle. In the laterally open casing, which is thus formed of the support member, 15 actuators are accommodated, which cause tightening of a gripping member 9 against the underside of the roof edge portion and, thus, clamping of the support member against the upper side of the roof edge. The gripping member 9 is in the shown embodiment formed as a metal sheet which in its lower part is bent in a hook-shaped 20 manner and which extends into the support member past the yoke member 7 and rests, with a support portion 9' above the yoke member, in a slidable manner against a supporting surface 10 in the interior of the support member. The 25 hook-shaped end portion of the gripping member is designated 9" in the drawing. A set bolt is designated 11. One end portion 11' of the set bolt extends in a hook-shaped manner round the yoke member 7 and its other end portion 11", which is threaded, extends through an opening in the 30 gripping member 9. A supporting nut 12 is screwed onto the threaded end portion and is used to set the distance between the gripping member 9 and the yoke member 7. To 35

the end of the lever 4, which in Fig. 4 is the upper end, a handle 14 is pivotally fixed by means of a pivot 13 and can be pivoted, together with the lever, between the position shown in Fig. 3 and the position indicated by 5 dash dot lines in Fig. 4. Above the pivot 13, the handle is provided with a locking lug 15, and the support member is in its upper part formed with a corresponding locking recess 16, in which the locking lug is insertable by pivoting the lever 4 upwards, the handle being in an outwardly pivoted position, and subsequently the handle is 10 pivoted downwards to the position indicated by dash dot lines in Fig. 4. As a result, the lever 4 forms together with the handle 14 a toggle joint system, which in the position indicated by dash dot lines in Fig. 4 forms a 15 folded knee which is positioned at the top and which can be straightened when pivoting to the position shown in Fig. 3. The handle 14 is designed to form a cover, which in the position indicated by dash dot lines in Fig. 4 covers the open outside of the support member and, consequently, 20 encloses actuator parts positioned in the support member and an associated motion transfer mechanism. When pivoting the lever 4, its cam-shaped eccentric portion 6 forms, together with the guide means 8, a scissor-blade-like motion, the yoke member 7 forming a slide member 25 which is made to perform a motion in front of the "pinch of the scissor blade" seen from the fulcrum 5 of the lever with the support member 3. The position of the yoke member is thus determined by the position of the "scissor pinch" i.e. the pivoting position of the lever 30 14 relative to the support member 3. The lever 4 can be considered a single-armed lever, the cam curves being located on the same side of the fulcrum 5 as the handle and oriented so that the "scissor pinch" is displaced away from the fulcrum as the handle/lever is pivoted 35 inwards to the support member 3.

By two parallel levers 4 being provided with identical eccentric portions 6, two spaced-apart, parallel

cam curves are formed. The distance between cam curves belonging to the same part and thus being phase-oriented relative to each other is bridged by the yoke member 7 which forms the slide member. The gripping member 9 is suspended from the yoke member 7 by means of the set bolt 4. By the adjustment of the distance between the gripping member 9 and the yoke member 7 which can be effected by means of the supporting nut 12, also the vertical position of the hook-shaped end portion 9' of the gripping member can be adjusted relative to the engaging part 3' of the support member. In the shown embodiment, the centre line of the threaded part of the set bolt 11 is positioned above the yoke member 7. When pivoting the lever 4 upwards, the eccentric portion 6 forces the yoke member 15 7 to move up the guide means 8 and thus pull along the gripping member 9 in this motion, which is controlled by cooperation between the upper portion 9' of the gripping member and the guide path 10 formed in the support member. The eccentric portion 6 is at the upper end of its active part formed with a shoulder 17, whose supporting edge for the slide member is directed transversely of the direction of the traction acting on the slide member. As a result, a self-locking effect will arise in the upwardly pivoted position of the lever 4, i.e. in the gripping 20 position, which means that the lever 4 is released of forces trying to pivot it outwards even if the yoke member 7 is subjected to a great load. Furthermore, the curvature of the cam curve is suitably adapted so that the exchange between the lever 4 and the gripping member 9 is greater during the last part of the clamping motion than 25 during the other part of the motion.

The load carrier is suitably fixed to a vehicle by placing it on the roof of the vehicle as shown in Fig. 1 with the gripping member 9 and the handle 14 hanging down 30 over the side of the vehicle. Subsequently the lever 4 is pivoted upwards by raising the handle 14 via the position indicated by full lines in Fig. 4 to the position which

is indicated by dash dot lines in Fig. 4, the "clamping position". With the supporting nut 12 set in advance in the correct position, it will thus be possible to clamp the support member with great force against the roof of the vehicle and thus efficiently fix the load carrier to the vehicle. The articulated connection of the handle with the lever 4 in the toggle joint 13 allows the lever to perform a very long pivoting motion independently of the thickness of the handle 14. This permits a great exchange of forces between the lever 4 and the gripping member 9. Consequently a very stable tightening can be carried out, without necessitating the application of excessive constraining force to the handle in order to fix the load carrier. The exchange can also be selected so that the pivoting of the lever causes a relatively great motion of the gripping member 9 in relation to prior-art devices. The great pivoting motion of the lever 4 makes it possible to perform an adaptation, suitable for the purpose, of the motion of the gripping member and an exchange of forces as required. The resulting liberty as to the design of the lower portion of the handle 14 renders it possible to make this portion so spacious as to allow gripping thereof by the person who is going to release the load carrier from the vehicle obtaining a large space for his fingers so that the handle can easily be pulled outwards to the release position. In a known manner per se, also the handle/protective cover 14 and the lever 4 can be provided with mutually compatible parts of a key-actuated lock to prevent the load carrier from being released by an unauthorised person.

The invention is not limited to the embodiment described above and shown in the drawings and can be modified in terms of details within the scope of the appended claims, without thereby departing from the basic idea of the invention. Thus, the principle of the lever arranged between the handle 14 and the support member and actuators arranged in the support member can be applied

also in connection with other actuators than those consisting of the yoke member controlled by eccentric action. Owing to the great pivoting motion which is feasible with the lever 4 according to the invention by its 5 toggle-joint-like connection with the handle/cover 14 according to the invention, a great exchange of forces/great motion of the gripping member can be achieved independently of which force-transferring devices that are besides used in the support member, although the intermediate arm arrangement described above has been found to 10 be particularly well suited in connection with the above-described force transfer arrangement. The cam curves on the lever can be provided with notches/shoulders to facilitate partial clamping for centring the load carrier on 15 the roof of the vehicle.

CLAIMS

1. A device in a load carrier for vehicles, which
5 is intended for roof mounting, said load carrier having
support members (3) which are adapted to rest against
the upper side of the vehicle roof (1) close to the edge
thereof, a gripping member (9) gripping the edge portion
of the vehicle roof in a hook-shaped manner, actuators
10 (6, 7, 8, 11) which are actuatable by means of a verti-
cally pivotable lever (4) and adapted to pull together
the support member (3) and the gripping member (9) to a
position gripping the associated roof edge portion, and
a handle (14) in connection with the lever (4) for ope-
15 rating the same, characterised in that the
lever (4) and the handle (14) are interconnected by means
of a pivot (13) which in the active state of the device,
i.e. in its clamping position, is positioned in the area
of the upper part of the support member, while the lever
20 at its other end portion is non-positively connected to
said actuators in the area of the lower part of the sup-
port member, the handle and the lever forming a toggle
joint system, which is foldable from the clamping posi-
tion with a folded knee located in the upper part of the
25 support member when pivoting the lever outwards to the
release position of the device while straightening said
knee.

2. A device as claimed in claim 1, characterised in that the handle (14) is designed to
30 form, in the clamping position, a cover which encloses
parts, positioned in the support member, of said actua-
tors and an associated motion transfer mechanism.

3. A device as claimed in claim 1 or 2, characterised in that the support member (3) and
35 the lever (4) each have a cam curve part (8, 6) which
is adapted to perform, when pivoting the lever (4), a
scissor-blade-like displacing motion, a slide member (7)

connected with the gripping member (9) extending through the open area between the two cooperating cam curves, i.e. outside "the pinch of the scissor blade" seen in the direction away from the fulcrum of the lever with the support member, the displacement position of the slide member being determined by the position of the "scissor pinch", i.e. the pivoting position of the lever relative to the support member (3).

4. A device as claimed in claim 3, characterised in that the lever (4) is formed as a single-armed lever, the cam curves (6) being located on the same side of the fulcrum (5) as the handle and oriented so that the "scissor pinch" is displaced away from the fulcrum as the handle/lever is pivoted inwards to the support member (3).

5. A device as claimed in claim 3 or 4, characterised in that the support member (3) and the lever (4) each have two spaced-apart, mutually parallel cam curves (6).

6. A device as claimed in claim 5, characterised in that the distance between cam curves belonging to the same part and thus being phase-oriented relative to each other is bridged by a yoke (7) which forms the associated slide member and from which the gripping member (9) is suspended.

7. A device as claimed in claim 6, characterised in that the suspension of the gripping member (9) from the yoke (7) consists of a bolt (11) which grips the yoke in a hook-shaped member and extends through the gripping member (9) and by means of which the vertical position of the gripping member relative to the support member (3) and, thus, the degree of tightening between the gripping member and the support member are adjustable by screwing.

8. A device as claimed in claim 7, characterised in that the centre line (18) of the threaded part, extending through the gripping member, of the

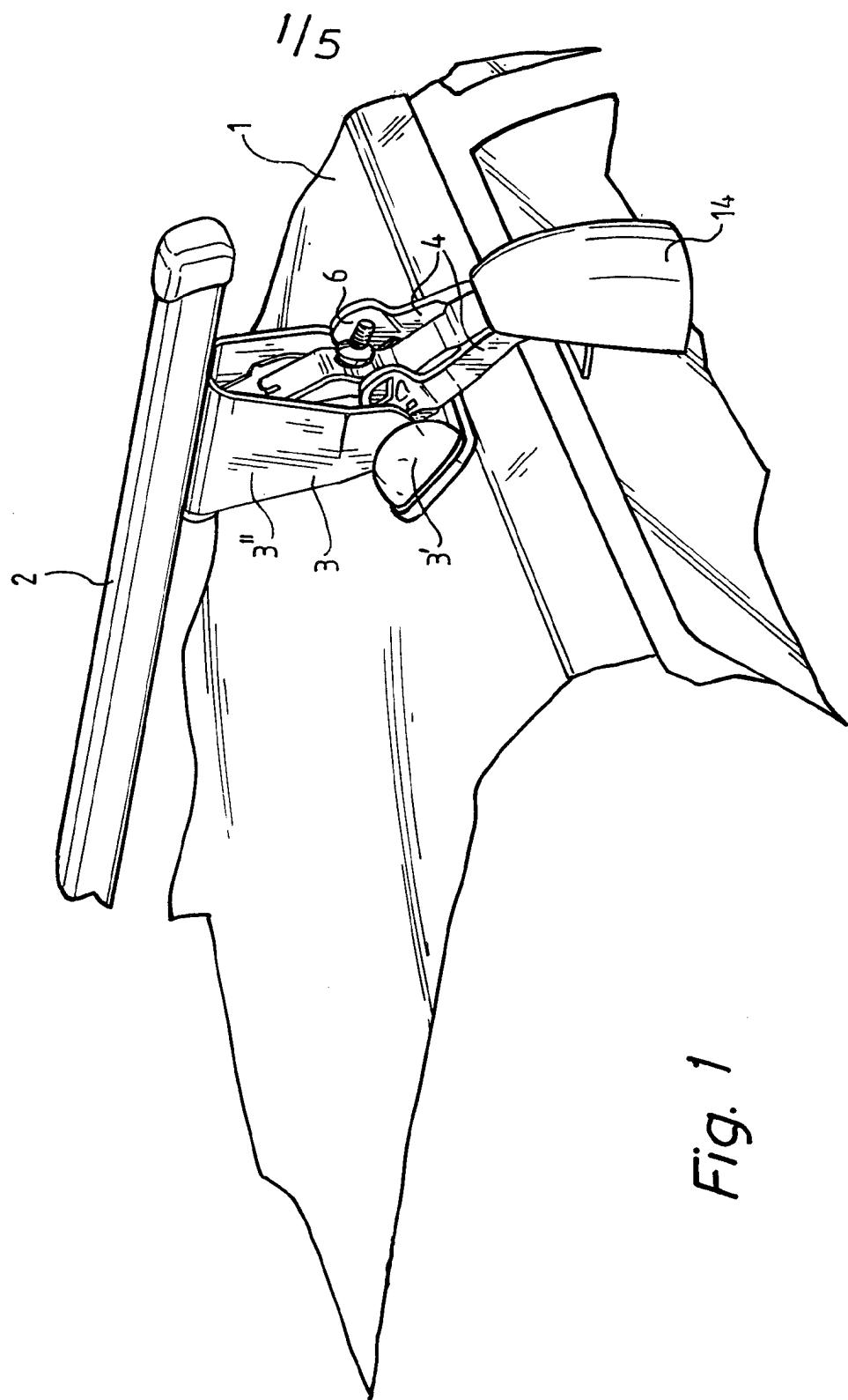
hook-shaped bolt is located above the corresponding centre line of the associated slide member (7), and said slide member is formed of a journal extending in parallel with the fulcrum and the toggle joint of the lever.

5 9. A device as claimed in any one of claims 3-8, characterised in that the cam curve parts (6) have a shoulder (17) which is arranged at least at one end of the active part of the cam curve parts, the supporting edge of the shoulder (7) for the slide member (7) 10 being directed transversely of the direction of the traction acting on the slide member.

10. A device as claimed in any one of the preceding claims, characterised in that the curvature of the cam curves is adjusted so that the exchange 15 between the lever (4) and the gripping member (9) is greater during the last part of the clamping motion than during the other part of the motion.

11. A device as claimed in any one of the preceding claims, characterised in that the handle (14) 20 on its part which in the clamping state is located above the toggle joint (13) has a hook member (15) which cooperates with the corresponding hook member (16) in the upper part of the support member (3) in the position of the handle pivoted inwards to the support member and is 25 disengageable therefrom by pivoting the handle away from the support member for locking the gripping member in the engaging position and for release thereof.

12. A device as claimed in claim 11, characterised in that the handle (14) carries a key- 30 operated lock which is insertable into the lever (4) and adapted to lock the toggle joint in the folded state, the clamping position of the device.



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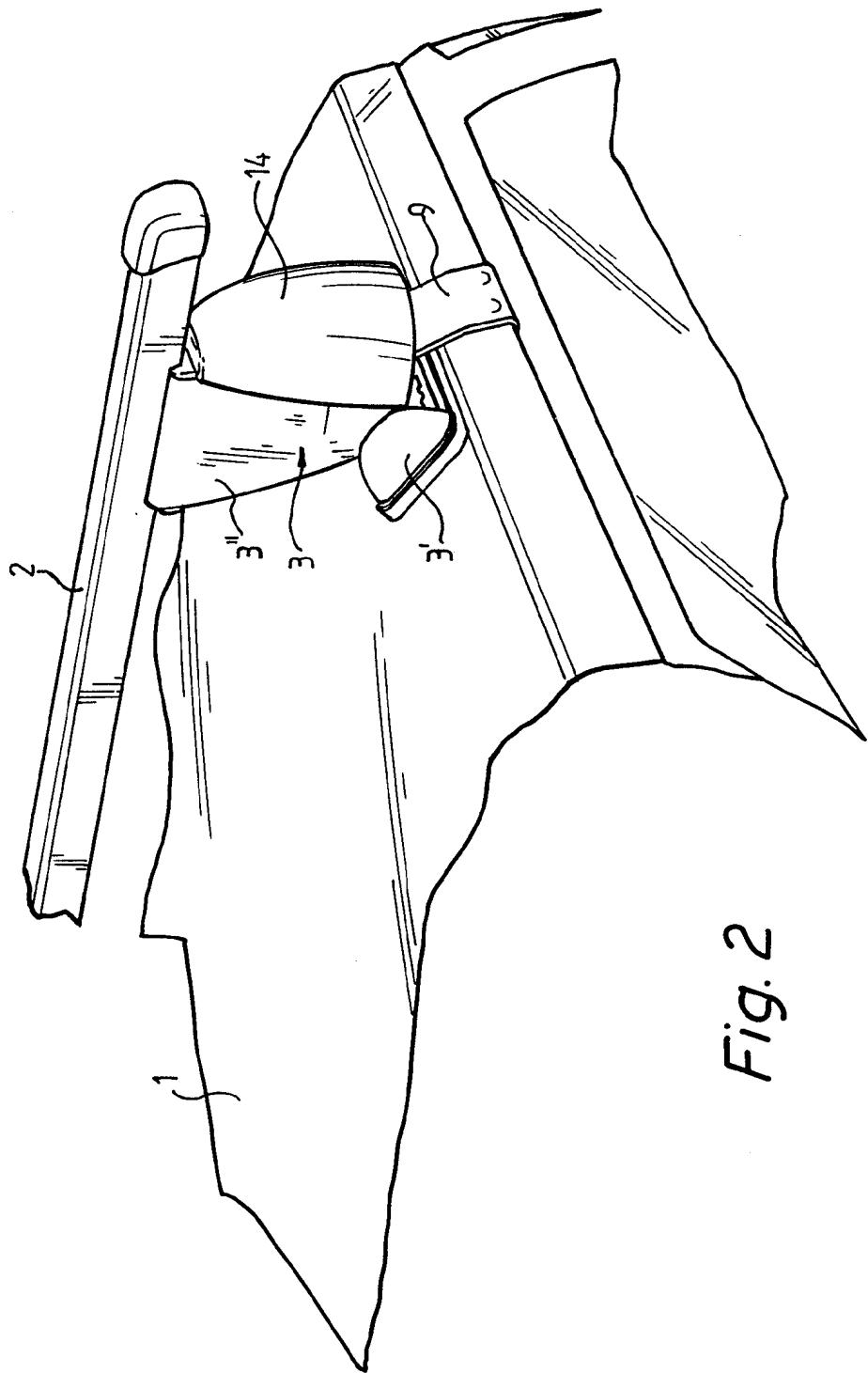
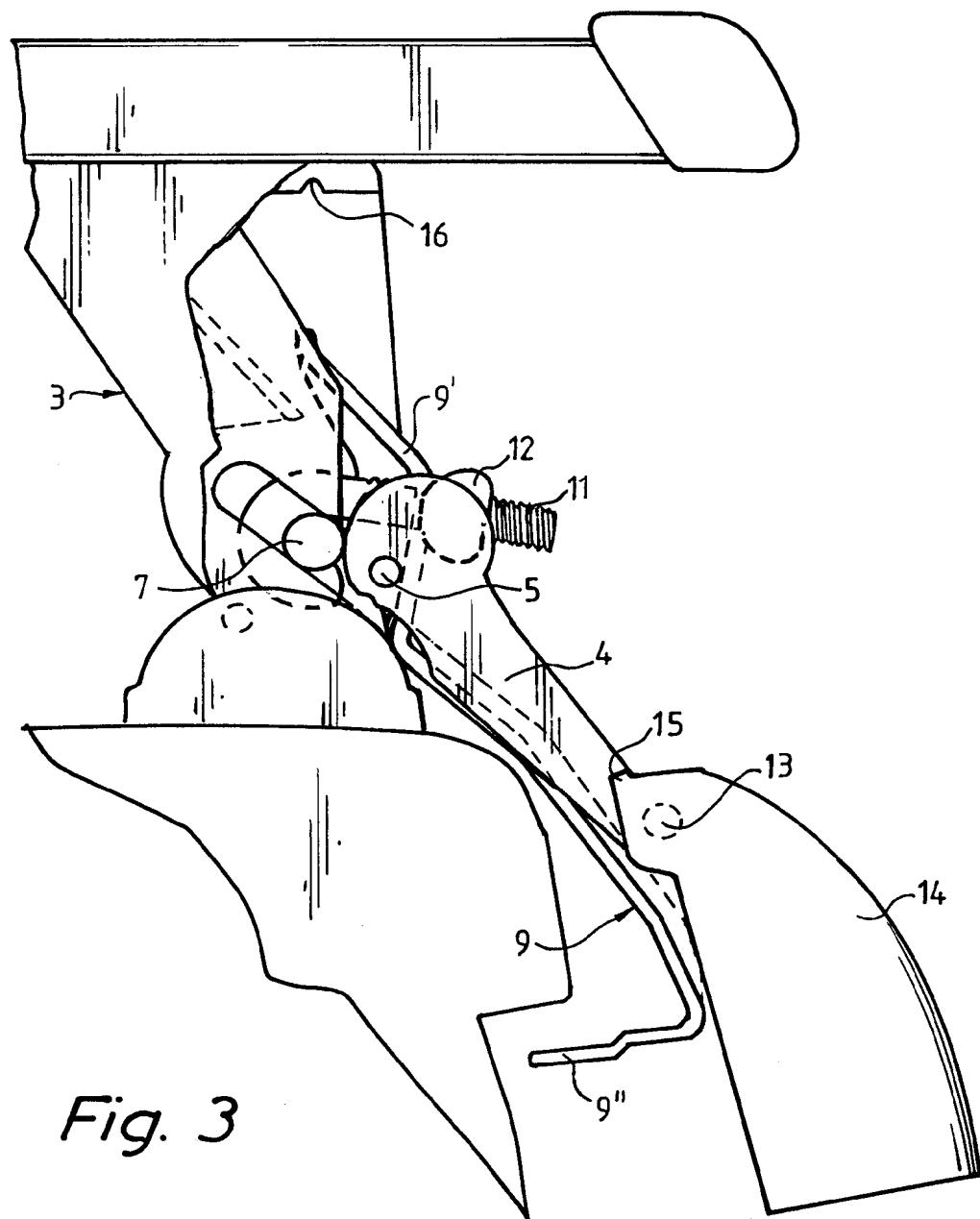


Fig. 2

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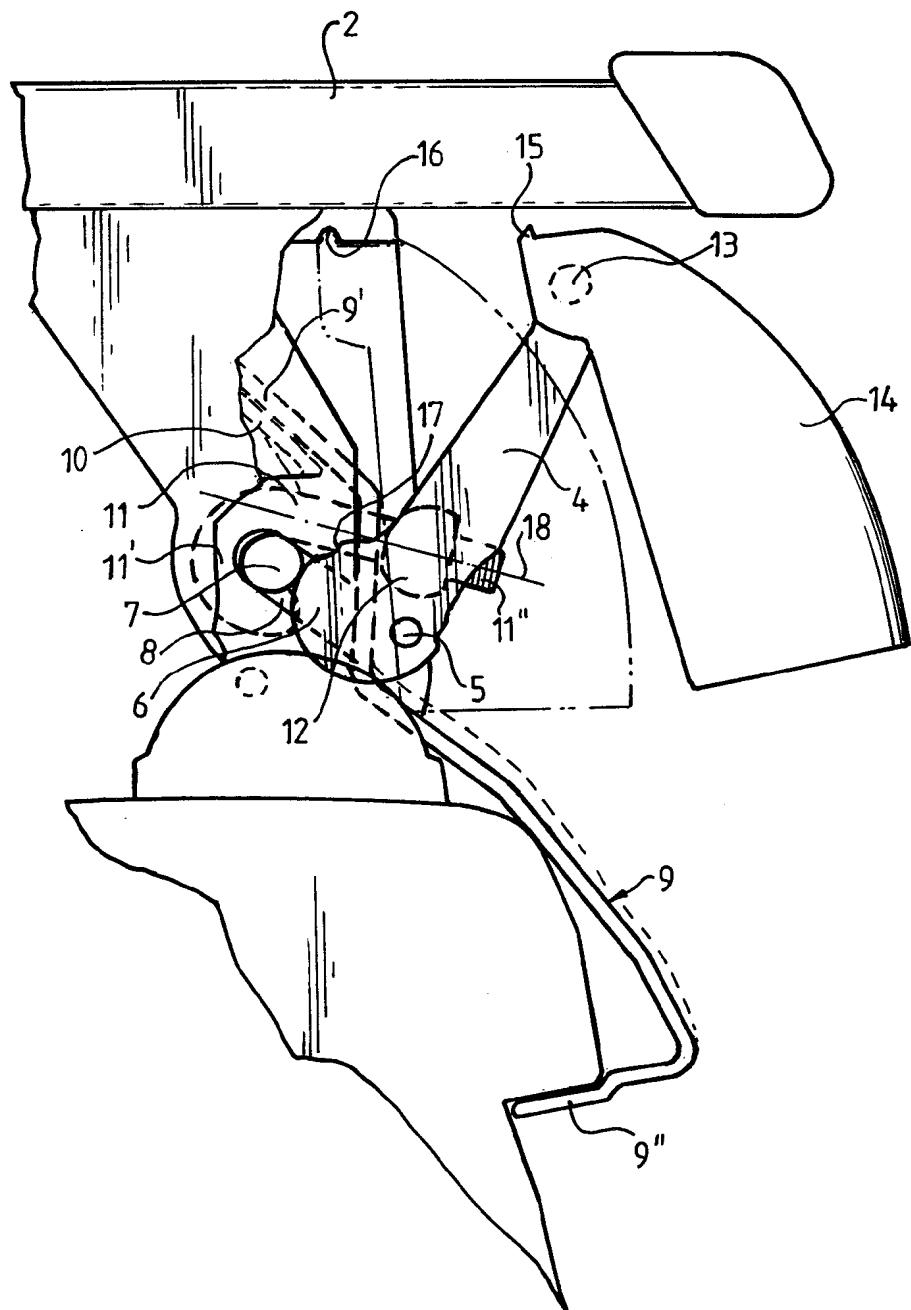
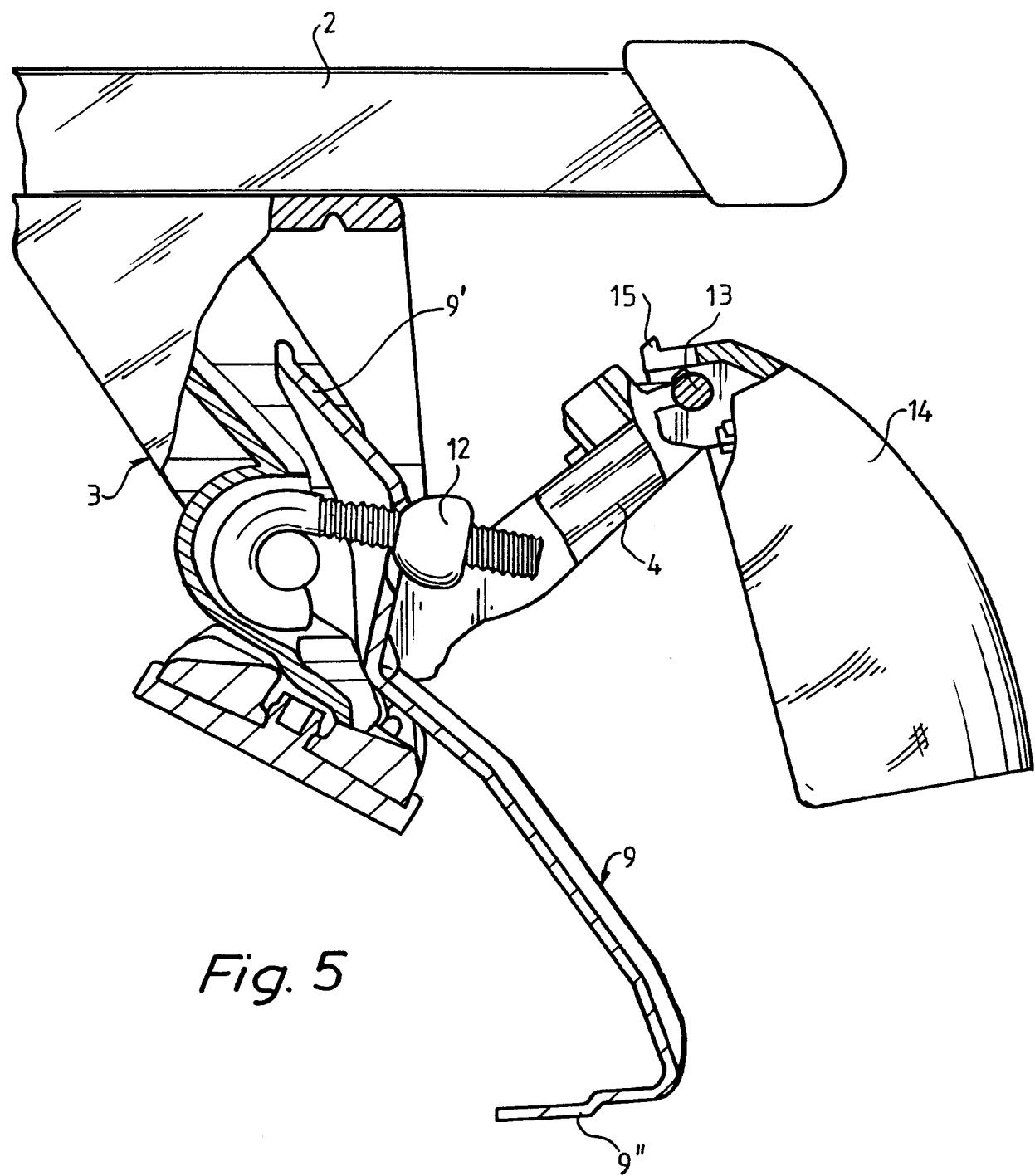


Fig. 4

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INTERNATIONAL SEARCH REPORTInternational application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60R 9/058

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9400315 A1 (MONT BLANC INDUSTRI AB), 6 January 1994 (06.01.94), page 10, line 30 - page 11, line 30, figure 10 --	1,2
A	WO 9511145 A1 (MONT BLANC INDUSTRI AB), 27 April 1995 (27.04.95) --	1-12
A	EP 091889 A2 (INDUSTRI AB THULE), 19 October 1983 (19.10.83) -- -----	1,2,11,12

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9400315 A1	06/01/94	AU 4363193 A DE 69305513 D,T EP 0646074 A,B JP 7508243 T SE 469329 B,C SE 9201975 A US 5588573 A	24/01/94 27/02/97 05/04/95 14/09/95 21/06/93 21/06/93 31/12/96
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